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Golder Associates

June 30, 1994

Project No.: 923-6112

U.S. Environmental Protection Agency (3HW24)
841 Chestnut Building
Philadelphia, PA 19107-4431

Attn: Mr. Frank Klanchar
Remedial Project Manager

RE: RESPONSE TO COMMENTS ON THE FEASIBILITY STUDY
CENTRE COUNTY KEPONE SITE, STATE COLLEGE, PA

Gentlemen:

On behalf of Ruetgers-Nease Corporation (RNC), Golder Associates Inc. (Golder) is pleased to submit three copies of a Response to Comments and associated revisions to the Feasibility Study (FS) for the above Site.

The enclosed documents respond to Agency comments received on April 26, 1994, as further discussed at our meeting on May 26, 1994. Revisions to the FS are referenced in the Response to Comments document and include the addition of new tables (6-24 through 6-26 and 7-3), new figures (7-1 and 7-2), a new section of text (7.6), as well as new appendices (H and I). Revisions for each section of the FS report are separated by a colored sheet of paper.

In a few instances, revisions have been made as a result of identifying a discrepancy in the original draft FS rather than in response to Agency comments, such as:

1. Appendix B: In Tables B-2 and B-5, the Quantitation Limits were not accurately reported for all samples;

2. Figure 6-4 was revised to make it clearer and more readable. The conceptual design was not changed; and,

3. The cost estimates for Present Worth presented in text Section 7.0 and in Tables 7-1 and 7-2 were rounded to the nearest thousand dollars.

To assist your review, revisions to the FS text are presented in redline and strike-through format. In cases where text changes necessitate repagination of the text, replacements have been provided for all affected pages.

AR308414

We have responded to all of the Agency comments in the manner generally agreed upon in our meeting on May 26, 1994. We remain committed to work with the Agency to ensure that the FS can be finalized in an expeditious manner and confirm our willingness to meet and promptly resolve any issues arising from your review of this submittal.

Very truly yours,

GOLDER ASSOCIATES INC.

Randolph White

Randolph S. White, P.E.
Associate

P.S. Finn

P. Stephen Finn, C.Eng.
Associate

RSW/PSF:lrl

Enclosure

cc: Ralph Pearce, P.E., RNC

AR308415

RESPONSE TO COMMENTS ON DRAFT FEASIBILITY STUDY
DATED OCTOBER 15, 1993

EPA COMMENTS

Section 1.0, Comment 1, Page 1-3:

Comment: *The "Site" description in this section and throughout this document is inaccurate in that it coincides with the Ruetgers-Nease property. This inaccuracy is further compounded by the Statement "The Site... and the Study Area together constituent the CERCLA Site evaluated in this FS". The use of two "Site" descriptions in this document is deceptive and erroneous, and must be corrected. In accordance with Section 101(9) of CERCLA, the Site must include all areas where hazardous substances from the Ruetgers-Nease facility have come to be located, including but not limited to the aquifer, Thornton Spring, and that section of Spring Creek which is designated as a no-kill zone. (PADER, #1).*

Response: Use of the terms "the Site" and "the Study Area" throughout the Feasibility Study (FS) Report is consistent with their use in the Remedial Investigation (RI) Report. The definitions of "the Site" and "the Study Area" are in Section 1.2.1 of the RI and consistency was maintained for ease in cross-referencing between documents. Mention of the CERCLA site as including both "the Site" and "the Study Area" was made in order to specifically acknowledge the definition required by Section 101(9) of CERCLA.

Section 3.0, Comment 1, Page 3-5:

Comment: *Note that flow ranges at Thornton Spring from 38 to 3,280 gallons per minute. This is important regarding the analysis of various remediation alternatives. (FWS)*

Response: The range of flows for Thornton Spring is acknowledged.

Section 3.0, Comment 2, Page 3-7:

Comment: *The description of the FWDD states that shallow groundwater discharges may occur within the lower section of the Drainage Ditch providing intermittent flow. Two points to make regarding this: 1) intermittent streams are "waters of the United States", and 2) it does not appear from the RI that these discharges have ever been sampled for Contaminants of Concern (COC). (FWS)*

Response: It is agreed that intermittent streams are waters of the United States. However, 40 CFR Part 122.2 clarifies that waters of the United States do not include waste water treatment systems designed to meet the requirements of the Clean Water Act. The upper reaches of the Fresh Water Drainage Ditch (FWDD) is therefore interpreted not to be a water of the United States because flow occurs due to the site's wastewater treatment plant which operates under a NPDES (Clean Water Act) permit. The lower reaches of the FWDD are interpreted to potentially be a water of the United States because flow in this reach is potentially sustained by shallow groundwater discharge during at least part of the year. The surface water in the lower reaches of the FWDD was sampled during the RI (refer to FS Report Section 3.5.2).

Section 3.0, Comment 3, Page 3-9:

Comment: *Sediment samples taken two feet below the surface showed higher concentrations of COC than did surface sediment samples. Could this be a result of the "shallow groundwater discharges" or sediments that have been buried by less contaminated sediments? Either way, it shows that remediation of these sediments is probably necessary. (FWS)*

Response: The samples referred to are located on the Ruetgers-Nease property where groundwater levels are consistently at least 30 ft. below ground level and so impact from groundwater discharge is precluded. The explanation of burial by less impacted sediments is much more plausible.

Section 3.0, Comment 4, Page 3-15:

Comment: *The discussion of Spring Creek fish tissue data needs to be revised in order to accurately describe the present situation. The statement "fish tissue levels over the years have shown a clear decline" has not been statistically substantiated in either the RI or the FS. The statement "fish tissue data are, therefore, not a responsive indicator of current exposure conditions" is grossly inaccurate. Kepone and mirex are persistent pesticides which dictate evaluating chronic exposure conditions. In this regard, fish tissue analysis has shown that kepone and mirex continue to contaminate the Spring Creek ecosystem almost 20 years after their production at the Ruetgers-Nease facility. (PADER, #2)*

Response: The decline in mirex and kepone levels in fish tissue over time was documented in the revised Environmental Risk Assessment dated March 1994 (refer to Figure 10). Additionally, both PFBC and USFWS have attested to the decline in testimony before the PaDER Environmental Quality Board (PaDER Environmental Quality Board Redesignation Appeal Hearing, High Quality-Cold Water Fishery, Spring Creek Township, April 2, 1991)

The statement "Fish tissue data are, therefore, not a responsive indicator of current exposure conditions." has been revised to state "Fish tissue data, therefore, may not be a responsive indicator of current transport of constituents from the Site to Spring Creek."

Section 3.0, Comment 5, Page 3-15 and 3-16:

Comment: ***The discussion of industrial waste discharges and sewage treatment plants (Cerro Metals, Bellefonte Lime Co., Rockview STP, Penn State Univ. STP, and Bellefonte STP) that are not located within the Study Area is totally misleading and must be deleted. (PADER, #3)***

Response: The final RI Report (October 1993 Revisions) referenced and summarized historical studies by PaDER which identified Cerro Metals Products Company, Inc., Warner Company (Bellefonte Lime Company), and Bellefonte Sewage Treatment Plant, among others, as possible sources of impacts to Spring Creek biota. As a result these potential sources of impacts were mentioned in the FS Report. However, for clearer consistency with the overall scope of the RI/FS, Cerro Metals Products Company, Inc., Warner Company (Bellefonte Lime Company), and Bellefonte Sewage Treatment Plant have been removed from these pages of the FS text as these facilities are downgradient of the Study Area. The Rockview STP and Penn State Univ. STP are relevant to the Study Area since they discharge into Spring Creek upgradient of the Benner Spring Fish Hatchery.

Section 4.0, Comment 1, Page 4-2 to 4-7:

Comment: ***The results of the baseline human health risk assessment suggest that measures should be considered to reduce potential risk from four sources: (1) mirex in recreational fish, (2) VOCs in groundwater, (3) mirex in on-site soils, and (4) VOCs in Thornton Spring water. These media and contaminants were selected because potential health hazards for some*** *exposure scenarios exceeded a lifetime cancer risk of 1e-6 or a non-cancer hazard index of 1. (EPA)*

Response: Ruetgers-Nease agrees that measures should be considered to reduce potential risk from VOCs in groundwater and in Thornton Spring water. These measures were discussed in Section 6.3 of the FS and remedial action alternatives were presented. The potential exposure to mirex in on-site soils leads to an excess lifetime cancer risk of greater than $1x10^{-6}$ only for the hypothetical on-site resident scenario. The likelihood of this scenario as an exposure pathway is remote as the site is already zoned industrial. Additional institutional controls in the form of deed restrictions would further ensure elimination of this exposure pathway. The potential human health risk for mirex in recreational fish is conservatively estimated as $4x10^{-5}$ which is within the USEPA's acceptable range for excess lifetime cancer risk. The Draft FS did, however, consider remedial action for mirex in recreational fish but did not provide a detailed analysis of alternatives. A detailed analysis of alternatives for Spring Creek sediments aimed at reducing mirex and kepone levels in fish tissue to less than the FDA levels has now been added to Section 7.6 of the FS. In addition, appropriate changes have been made to Sections 5.10 and 6.7 with respect to Spring Creek sediments technologies and alternatives. Cost estimates for Spring Creek alternatives are provided in Tables 6-24 through 6-26.

Section 4.0, Comment 2, Page 4-7:

Comment: *A summary of the risk assessment indicates that the recreational visitor scenario, which includes the ingestion of fish, has a potential cancer risk of 4×10^{-5}, and a cumulative HI of 1. Given that this scenario is borderline, albeit conservative, remedial alternatives to address this scenario should be considered. (EPA)*

Response: The potential human health risk for mirex in recreational fish is conservatively estimated as $4x10^{-5}$, which is within the USEPA's acceptable range for excess lifetime cancer risk. The Draft FS did consider remedial action for mirex in recreational fish but did not provide a detailed analysis of alternatives. A detailed analysis of alternatives for Spring Creek sediments aimed at reducing mirex and kepone levels in fish tissue to less than the FDA levels has now been added to Section 7.6 of the FS. In addition, appropriate changes have been made to Sections 5.10 and 6.7 with respect to Spring Creek sediments technologies and alternatives. Cost estimates for Spring Creek alternatives are provided in Tables 6-24 through 6-26.

Section 4.0, Comment 3, Page 4-8 and 4-9 - RMU2 Freshwater Drainage Ditch:

Comment: *Saturated soil may serve as a habitat for aquatic invertebrates. Predicted risks could apply here even though this is not aquatic habitat in its traditional sense. The lack of certain sensitive species should not eliminate risk. The inference that species used for toxicity tests are very sensitive is not necessarily correct. Test organisms are usually chosen on the basis of ability to be cultured and lack of extreme response to a spectrum of contaminants. (PFBC)*

Response: It is anticipated that FWDD sediments will be remediated for groundwater protection reasons and so the perceived potential risks to aquatic invertebrates will be mitigated.

Section 4.0, Comment 4, Page 4-8 and 4-9 - RMU2A:

Comment: *According to this section, the risks are overestimated because the water quality criteria and estimated sediment criteria "used in the assessment were derived for the protection of very sensitive aquatic species (e.g., fish and crayfish)." Sensitivity to chemicals is not usually related to the phylogenetic position. I would not expect fish and crayfish to be more sensitive to VOCs than are insects, although insects may be more sensitive to the insecticides kepone and mirex than fish or non-insect invertebrates. There could easily be a case, however, where a non-insect invertebrate is more sensitive to kepone or mirex than an insect. These sorts of relationships were investigated early in the evolution of aquatic toxicology, and only one useable relationship was established - if fish and invertebrates are protected, then plants are also protected. Regardless, although this section of the ditch may not provide habitat for fish and crayfish, it may provide habitat for "sensitive" species. (FWS)*

Response: Refer to Response to Comment 3, Section 4.0 above.

Section 4.0, Comment 5, Page 4-9 - RMU2B:

Comment: *As with RMU2A, we do not know if this section of the ditch could support sensitive species, so risks are not necessarily overestimated. (FWS)*

AR308420

Response: Refer to Response to Comment 3, Section 4.0 above.

Section 4.0, Comment 6, Page 4-9 and 4-10 - RMU3:

Comment: *Discussions of dilution of Thornton Spring water once it reaches Spring Creek and sediment toxicity of Spring Creek sediments is not relevant to the risk to Thornton Spring. Risk was inferred from the risk assessment in three of four possible instances in Thornton Spring (two media, surface water and sediments, and two COC, kepone and mirex). There is little discussion about that risk. (FWS)*

Response: Risk from Thornton Spring surface water was discussed with regard to dilution in the FS. The first exposure point of fish to Thornton Spring water is within Spring Creek. Thornton Spring itself does not support fish life as explained in the response to Section 4.0, Comment 7. Regardless, remediation of Thornton Spring surface water has been addressed by virtue of the source control of groundwater.

There is very little sediment in Thornton Spring. Although potential ecological risk was calculated for Thornton Spring sediment, impacts have not been documented and the risk is not considered to be significant. (Refer to Section F of the Environmental Risk Assessment dated March 1994.) Since the potential risk to fish from Thornton Spring sediment would be from the sediment being washed into Spring Creek, sediment toxicity testing was performed on a sample from the Spring Creek-Thornton Spring mixing zone (refer to Sediment Toxicity Summary Report dated January 1994).

Section 4.0, Comment 7, page 4-9 and 4-10 - RMU3 (Thornton Spring):

Comment: *Thornton Spring was toxic. As a perennial stream, it could support fish life and provide spawning habitat for brown trout resident to Spring Creek. Risks to fish and invertebrates should be considered and not brushed aside because of sediment toxicity testing done outside of RMU3, a low quotient for mirex in sediment, and the simple presence of some organisms in Thornton Spring sediment. (PFBC)*

Response: Thornton Spring discharges into Spring Creek via a culvert pipe that is above the normal water level of the Creek, which would keep fish from entering the Spring and using it as spawning habitat. Thornton Spring is only approximately 200 feet in length; its highly variable flow and confluence through the culvert pipe above Spring Creek precludes it from being a productive aquatic habitat.

Section 4.0, Comment 8, Page 4-11 - RMU5 (Spring Creek below Thornton Spring and FWDD):

Comment: *The PFBC believes the risk to benthic organisms for kepone is real. We place credence in the reduced growth of chironomids in site sediments, and no credence in the broad-scope conclusion that the presence of abundant macroinvertebrates and brown trout discounts any negative effects from the site. (PFBC)*

Response: The reviewer's comment is noted but is at variance with the opinions of the specialist technical consultants retained by Ruetgers-Nease Corporation (Dr. John Rodgers of the University of Mississippi, ENVIRON Corporation, and Weinberg Consulting Group).

Section 4.0, Comment 9, Page 4-11 - RMU5:

Comment: *Impacts to Spring Creek are sporadic, and although investigations have not attributed problems solely to the site, neither is the site excused from the observed sporadic impacts. Given the variability in loading of COC, sporadic impacts would be expected. (FWS)*

Response: Ruetgers-Nease acknowledges that sporadic impacts to Spring Creek might be expected in association with multiple potential sources including the Site.

Section 4.0, Comment 10, Page 4-16:

Comment: *Section 4.3.3 mentions surface water quality standards adopted by the State. These standards include narrative statements that prevent the discharge of toxic substances in toxic amounts (25 Pa. Code, Chapter 93.6(a)). Perhaps this should be mentioned since surface water from the Site and Thornton Spring water have demonstrated toxicity. Also, the designated use for Spring Creek is actually "High Quality-Cold Water Fishes" (25 Pa. Code, Chapter 93.91). (FWS)*

Response: It is agreed that according to 25 PA Code, Chapter 93.9(l) the designated use for Spring Creek in the reach adjacent to the site is "High Quality-Cold Water Fishes." 25 PA Code, Chapter 93.6(a) does include narrative criteria which state that in-stream concentrations may not be harmful to the designated water uses to be protected, or to human, animal, plant, or aquatic life. 25 PA Code, Chapter 93 implements the Federal Clean Water Act, which sets a national policy to "prevent discharge of toxic substances in toxic amounts." The above clarifications have been added to Section 4.3.3 (page 4-16) of the revised FS text.

Section 4.0, Comment 11, Page 4-16:

Comment: *The text states that corrective action requirements of Title 25, PA Code, Chapter 264.100(a)(9) are related to RCRA TSD facility operations only, and therefore, are not applicable to the Site. This interpretation is not entirely correct. There is a long documented history of application of the Title 25 corrective action requirements to CERCLA sites throughout the Commonwealth of Pennsylvania, including many sites which are not or were not RCRA TSD facilities. For example, Chapter 264.1(a)(7) states that "...the applicable regulations of this title apply fully to the management of any spill residue or debris which is a hazardous waste under Chapter 261." Therefore, this ARAR cannot likely be disregarded with respect to groundwater contaminants at the Site. (EPA)*

Response: The quotation from Chapter 264.1 appears to be from 264.1(c)(7). However, it does not specifically cite the Subchapter F groundwater corrective action performance standards (background) contained in Chapter 264.100(a)(9) as being applicable. Subchapter F applies to an owner or operator of a landfill, land treatment facility, waste pile or surface impoundment which is used to manage hazardous waste. It is unclear if the waste disposal areas of the site fit the regulatory definition of these solid waste management units, therefore, the applicability of 264.100(a)(9) is unclear. Further review of the USEPA document <u>CERCLA Compliance with Other Laws Manual</u> (Interim Final, August 1988, EPA/540/G-89/006) indicates that certain portions of RCRA (and hence, some of the USEPA-approved portions of the Commonwealth hazardous waste regulations) might apply to groundwater response actions at the site. The applicability of each RCRA criteria depends upon the nature of the material, the manner in which it came to be currently located, and the nature of the CERCLA response action. These are assessed as potential action-specific requirements under the detailed analysis of alternatives. 25 PA Code, Chapter 264.100(a)(9) might be ARAR for groundwater response actions at the site. However, considering the presence of karst bedrock conditions and NAPL, restoration of groundwater to background conditions is technically impracticable (refer to response to comment nos. 14, 15, 19, 20) and an ARAR waiver should be granted upon approval of an impracticability demonstration. The text in Section 4.3.3 (pages 4-17 and 4-18) and note 1 in Table 4-3 have been revised accordingly.

Section 4.0, Comment 12, Page 4-16 through 4-19:

Comment: *The Pennsylvania ARAR for groundwater for hazardous substances is that all groundwater must be remediated to "background" quality as specified by 25 Pa. Code 264.90 - 264.100 and in particular, by 25 Pa. Code 264.97(i), (j), and 264.100(a)(9). The Commonwealth also maintains that the requirements to remediate to background is also found in other legal authorities. Pennsylvania also certifies that the background groundwater quality ARAR becomes an ARAR for soils by reason of the hydrogeologic link to the groundwater from the Site soils. Soils should be remediated to ensure that migration of soil contaminants to groundwater do not cause groundwater contamination concentrations to exceed background cleanup levels. (PADER, #4)*

Response: Refer to response to Comment 11. A technical impracticability (TI) demonstration has been developed and a waiver of the background performance standard asserted on the basis of 25 PA Code, Chapter 264.100(a)(9) will be sought. Therefore, this performance standard (no detectable impacts to on-site groundwater) should also be waived for on-site soils in conjunction with source control. The TI demonstration is presented as a new Appendix I to the FS.

Section 4.0, Comment 13, Page 4-18:

Comment: *Note that ARARs in Section 4.3.4 extend to Thornton Spring. This could cause a problem because it appears that groundwater ARARs may be less stringent than surface water quality criteria. (FWS)*

Response: Groundwater requirements are ARAR for groundwater up to Thornton Spring. Upon discharge to Thornton Spring, surface water requirements are ARAR.

Section 4.0, Comment 14, Page 4-18:

Comment: *The text defines the area of attainment to begin at approximately the hydrogeologic downgradient property boundary of the Site (defined as the boundary of the waste remaining in place) and extend to Thornton Spring (the estimated boundary of the constituent plume). Based on this definition, it is presumed that the entire Site is underlain by waste, which is probably contradictory to the actual situation and findings of the RI.*

For example, the waste at the Chemfix lagoon was removed and the site was considered closed with respect to further remedial action, as no additional work was conducted in that area during the recent RI. Based on EPA guidance (Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites), "...if a source is removed, the entire plume is within the area of attainment." Further, the area immediately west of the former Chemfix area has also not been identified as being a "waste area" during the RI. Therefore, the delineation of the area of attainment should be reconsidered to be inclusive of all non-waste areas. Figure 6-5 (Areas Proposed to be Capped for Subsurface Soil Remediation) is a good example depicting the "waste areas." Using this figure as a basis, the areas not highlighted would be included in the area of attainment.

Accurate delineation of the area of attainment is critical in developing the most appropriate groundwater remedial alternatives. (EPA)

Response: The original boring log for MW-7A located immediately southwest of the concrete lagoon reported that free hydrocarbon was encountered at a depth of 112'. Free product has also been observed in subsequent pumping from this well and well MW-6 further downgradient as part of the existing groundwater remedial system. Based on these observations, it would appear that free product is present in groundwater in these areas of the Site within cavities and fractures of the karstic bedrock. Therefore, irrespective of the current status of surface disposal areas, the current delineation of the area of attainment is considered appropriate.

Section 4.0, Comment 15, Page 4-18:

Comment: *The FS states that between the source area and property boundary, the remedial objective will be to contain contamination. Beyond the property boundary, in the area of attainment, the goal will be restoration to background water quality. It should be stated that the containment area is inclusive of DNAPL contamination; and the objectives in the containment* *area include removal of mobile DNAPL and the containment of the DNAPL contamination zone, per EPA 600/R-93/022 February 1993, R.M. Cohen and J.W. Mercer, 1993, DNAPL Site Evaluation, p. 6-5. (EPA)*

Response: It is agreed that within the containment area the objectives will include removal of mobile DNAPL, where possible, and the containment of the DNAPL contamination zone. Free product recovery will be accomplished at the treatment plant via the equalization tank which will be used as a phase separator. The existing groundwater recovery system removed mobile NAPL when it was first commissioned, however, the amount of free product recovery decreased rapidly and dual phase extraction equipment is therefore not considered warranted. The text in Sections 6.3.3 (page 6-9) and 6.3.4 (page 6-11), as well as Tables 6-14 and 6-15, have been revised to reflect free product recovery.

Section 4.0, Comment 16, Page 4-19 - General Comment:

Comment: *The text describes the rationale as to why the Commonwealth of Pennsylvania "background" ARAR is not appropriate for the groundwater outside the area of attainment, i.e., as a basis for the Summers Model application. It should be noted that, in general, there appears to be very little contaminant retardation or degradation between the Site and Thornton Spring. Dilution is probably the only major factor in reducing COC concentrations between the Site and the spring, and dilution is not considered an acceptable remedial alternative. Therefore, the development and presentation of conservative soil criteria should be considered, as this will be most effective in meeting one of the primary remedial objectives — the reduction of COC concentrations at Thornton Spring. Conservative soil criteria based on meeting the Pennsylvania ARAR, if it is to be applied at this site, will probably result in the most effective reduction in COC concentrations Site-wide.*

It should also be noted that the Commonwealth of Pennsylvania policy for virgin fuel contaminated soil, although not directly appropriate for the site (as stated), provides an approach to the calculation of potential soil cleanup criteria. This approach remains viable for the development of Site-specific soil criteria. (EPA)

Response: The primary source of groundwater COC is considered to be free product in karst bedrock fractures and cavities both above and below the groundwater table, not COC in soil. Groundwater remedial alternatives considered will mitigate VOC concentrations at Thornton

Spring. In addition, capping in areas identified by the Summer's model as exceeding allowable concentrations would mitigate COC leaching from soil and would meet the RAOs for soil. As further discussed in Response to Comment 17, Section 4.0 below, the Pennsylvania policy approach for the calculation of potential soil cleanup criteria suffers from the same technical limitations as the Summer's model and is not considered to offer any additional benefit.

Section 4.0, Comment 17, Page 4-21:

Comment: *The text indicates that mirex and kepone in the subsurface soil and FWDD sediments are not expected to present a source of impact to groundwater, based on the Summers Model results. This conclusion may not be entirely correct. Partition coefficients for mirex and kepone used in the Summers Models were developed based on pure product experiments or calculations. It is clear that mirex and kepone, in a pure state, have a strong affinity for soil, especially given their low respective solubilities. However, in the presence of other organic compounds, namely the solvents, the partition coefficients for mirex and kepone can change drastically, increasing overall solubility and migration potential. It is the presence and mixture of organic compounds that initially enabled kepone and mirex to migrate to the groundwater. Therefore, it is likely that the partition coefficient values used for the Summers Model are not representative of the actual conditions at the Site, and consequently these values cannot be used without qualification to calculate mirex/kepone soil criteria. With qualification, the concentrations of kepone and mirex present may continue to pose a threat to groundwater at current concentrations.*

It should be noted that the presence of multiple compounds also likely affects the partitioning properties of the other volatile organic compounds as well. Unfortunately, only site specific experiments can yield sufficient site specific partition data for the development of detailed soil criteria. Given that site specific information cannot be attained at this time, an alternative approach to the Summers Model for kepone/mirex soil criteria development should be considered. (EPA)

Response: It is acknowledged that available partition coefficients for mirex and kepone were developed for pure product and the presence of solvents potentially modifies their behavior. Staples and Geiselmann (1988) investigated the effects of solvents on the partition coefficient of kepone and reported that at least 5% solvent/water mixture was needed to reduce the coefficient. The likelihood of such solvent concentrations in vadose zone water (essentially infiltrating rainwater) is remote and therefore the partition cofficients used are considered appropriate.

Additional evidence that the partition coefficients used are not inappropriate is provided by a comparison of the Summer's model predictions with actual observations. Clearly, if the partition coefficients used in the Summer's model were significantly in error, it would be expected that observed concentrations of mirex and kepone in groundwater would significantly exceed those inferred from the Summer's model; however, this is not the case. By way of example, observed groundwater concentrations of mirex and kepone only exceed the groundwater quality goals used in the Summer's model at one location (MW-23S), although measured soil concentrations approach the allowable values predicted by the model at several locations. The FS text on page 4-22 was revised to more precisely describe the comparison of the Summer's model results to the subsurface soil data.

Alternative approaches to the Summer's model have been considered including the recently released CREST model (PaDER, 1993). However, this model and other similar models considered, including VLEACH (USEPA, 1990) all rely upon the use of partition coefficients and therefore do not offer any advantage over the Summer's model.

References:

Staples, C.A., and S.J. Geiselmann, 1988, Cosolvent Influences on Organic Solute Retardation Factors, Groundwater Vol. 26, No. 2, pp. 192-198.

PaDER, 1993, Criteria Estimation Modeling System.

Turin, J., 1990, Vadose Zone Leaching Model.

Section 4.0, Comment 18, Page 4-21 - General Comment:

Comment: *Based on the discussion presented in Comment #11 [Section 4] regarding applicable ARARs for groundwater, the results of the Summers Model, as presented in the text, may have to be revised to reflect changes in the groundwater quality goals. (EPA)*

Response: Refer to Response to Comments 11 and 12, Section 4. A technical impracticability demonstration has been developed and is presented as a new Appendix I to the FS and an ARAR waiver for groundwater is to be sought.

Section 4.0, Comment 19, Page 4-22:

Comment: *It is stated in Section 3.3 on page 3-4 that certain VOC constituents detected were present at concentrations greater than 10 percent of the water solubility of the constituent, indicating the possibility of DNAPL. It is suggested the DNAPL may be contained in cavities in the karst bedrock. At present, no RAO specifically addresses DNAPL recovery. This possibility and objective should be addressed. (EPA)*

Response: While there has not been an RAO specifically developed for the recovery of NAPL, as discussed in Section 4.0, Response to Comment 15, recovery of mobile NAPL will be accomplished by a phase separator in the treatment plant.

Section 4.0, Comment 20, Page 4-25 and 4-26 - Sec 4.6.2:

Comment: *The PFBC agrees that groundwater and Thornton Spring remedial action alternatives should be coupled. Since Thornton Spring recharge from the Site has been demonstrated, and discharge from the spring reflects groundwater quality, the ARAR of meeting drinking water MCLs, referenced in PADER's <u>Groundwater Quality Protection Strategy</u>, Section 4.3.5, should be applied to Thornton Spring. It is noted from Table 4-4 that Thornton Spring water exceeds drinking water maximum contaminant levels for total 1,2 dichloroethene, tetrachloroethene, and trichloroethene. (PFBC)*

Response: The remediation goal for Thornton Spring is either non-zero MCLGs, MCLs, or PA surface water quality standards, whichever is lowest for each constituent (the text on page 4-25 of the FS has been revised to list these items). Achieving this remediation goal will restore the quality of water to comply with the national Clean Water Act program goal to protect all surface water for potential future public supply uses. The feasibility study presents a range of alternatives to address this goal including source control (i.e., collection and treatment of impacted groundwater which would otherwise discharge to the spring). Deed restrictions on Thornton Spring imposed by the Agencies could also prevent future use as a potable source, a scenario which is already highly unlikely.

Section 4.0, Comment 21, Page 4-26:

Comment: *I do not recall reading anywhere in the RI that potential sources other than the Site may be affecting the groundwater quality between the Site and Thornton Spring. Ruetgers-Nease has had ample opportunity to document such potential sources, but apparently has not done so. Since it is not mentioned in the RI, this passage should be deleted. (FWS)*

Response: The RI included a map (Figure 3-24) showing the location of adjacent businesses in the downgradient area of the Study Area. At the USEPA's request, the revised RI (dated October 1993) included an extensive summary of historical reports and conclusions including impacts in the Study Area to fish from a gasoline spill and release from a gasoline station along Route 26 and to surface water, aquatic life and benthics from various STPs. Additionally, the NUS-FIT III investigation referenced in the original RI noted contributions to surface water COCs from other sources along Route 26. Therefore, inclusion of the passage on page 4-27 is considered appropriate.

Section 4.0, Comment 22, Page 4-27:

Comment: *I strongly disagree with the statement that "no RAOs are required for Thornton Spring sediment". The risk assessment definitely shows some risk due to kepone concentrations in sediment. Thornton Spring sediments have high levels of VOCs, which were not taken into account by the risk assessment. This could increase the risk from kepone due to increased bioavailability of kepone in the presence of organic chemicals. Some of the arguments made in the FS to minimize the risk are simply faulty -- the results from a sediment toxicity test of a sample taken in Spring Creek, are not relevant to Thornton Spring sediment. The fact that some organisms were observed in Thornton Spring sediments does not mean that other, more sensitive organisms, are not being adversely affected. Two of the initial RAOs for soil and sediments (Section 4.5.2) are "prevent current and future exposure of COC above acceptable levels" and "protect environmental receptors". These are applicable to Thornton Spring sediments. Midges, crayfish, and earthworms are presently living in the contaminated Thornton Spring sediments and will accumulate kepone. They could be consumed by terrestrial organisms or make their way to Spring Creek where they can be consumed by trout or other fish (accumulation of kepone by fish can have* *a significant dietary component). Thornton Spring sediments can be flushed from the channel into Spring Creek where they would be available to affect organisms there. (FWS)*

Response: Refer to Response to Section 4.0, Comment 6.

Section 4.0, Comment 23, Page 4-27 - Sec 4.6.3:

Comment: *RAOs should be developed for Thornton Spring sediment based on contaminant of concern concentrations shown in analyses. The quotient ratio of 72 for kepone shows potential risk, and surface runoff in extreme precipitation events could flush sediment downstream from the Thornton Spring stream bed. (PFBC)*

Response: Refer to Response to Section 4.0, Comment 6.

Section 4.0, Comment 24, Page 4-29 to 4-31 - Sec 4.6.6 and 4.6.7:

Comment: *FWDD surface water and sediments have COC and predicted environmental risks associated with them. The final RAO should include protection of aquatic habitat and receptors, and prevention of sediment from entering Spring Creek. (PFBC)*

Response: Refer to Response to Section 4.0, Comment 3.

Section 4.0, Comment 25, Page 4-30:

Comment: *Section 4.6.7 also suffers from the same faulty reasoning that is present earlier in the document (Section 4.2.3). I disagree that a risk quotient of 50 from only one chemical represents "marginal" risk. Since aquatic organisms are present in both sections of the ditch, RAOs should be developed similar to the ones I believe are applicable to Thornton Spring sediments. Also, Section 3.5.3 stated that sediment samples taken two feet below the surface showed higher concentrations of COC than did surface sediment samples. These sediments may eventually make their way to Spring Creek. (FWS)*

Response: Refer to Response to Section 4.0, Comment 3.

Section 4.0, Comment 26, Page 4-32:

Comment: *I do not understand why "upstream impacts must be taken into account when assessing ARARs in Spring Creek". Contaminants from the Site must be controlled regardless of upstream influences on Spring Creek water quality. (FWS)*

Response: It is agreed that COC from the Site must be controlled, but the ability to meet ARARs will also be dependent on other upstream sources over which Ruetgers-Nease has no control. This must be taken into consideration during future performance monitoring of Spring Creek. Page 4-33 of the FS text has been revised to clarify this issue.

Section 4.0, Comment 27, Page 4-32:

Comment: *If there are no unacceptable potential human health risks associated with exposure to Spring Creek sediments or from ingestion of fish, the question is posed: why is a section of Spring Creek designated as a no-kill zone because persistent pesticides concentrations in trout exceed FDA action levels? (PADER, #5)*

Response: The catch and release order was imposed in 1982 when levels of pesticides in fish tissue were higher than they are today. Mirex and kepone levels in fish tissue have declined over time as documented in the revised Environmental Risk Assessment (ENVIRON, March 1992). Additionally, both PFBC and USFWS have attested to the decline in mirex and kepone in testimony before the PaDER Environmental Quality Board (PaDER Environmental Quality Board Redesignation Appeal Hearing, High Quality-Cold Water Fishery, Spring Creek Township, April 2, 1991). The risk assessment, performed using the data collected during the RI, indicates that the risk associated with exposure to Spring Creek sediment or from ingestion of fish is within or less than USEPA's acceptable risk range of $1x10^{-4}$ to $1x10^{-6}$ for potential excess lifetime cancer risks and less than or equal to a cumulative Hazard Index of 1 for non-carcinogenic health effects.

Section 4.0, Comment 28, Page 4-32:

Comment: *The final RAO for Spring Creek sediments deals with reducing bioavailability of kepone and mirex, in order to reduce levels in fish tissue* *below FDA action levels. Given this, and the fact that sediments invariably move downgradient, it appears that RAOs for tributary sediments must be developed as well (Thornton Spring and FWDD) in order to also reduce bioavailability of kepone and mirex. (FWS)*

Response: Source control measures in the FWDD already included in the FS will lead to a reduction in the bioavailability of COCs. With regard to Thornton Spring sediment, refer to the Response to Section 4.0, Comment 6.

Section 4.0, Comment 29, Page 4-33 - Section 4.6.9:

Comment: *I agree with the RAO of reducing bioavailability of kepone and mirex in sediments so fish tissue levels of kepone and mirex do not exceed FDA action levels. (PFBC)*

Response: Acknowledged.

Section 4.0, Comment 30, Table 4-4:

Comment: *The frequency of detects for Thornton Spring is misleading. While individual VOCs may have only been detected at most 6 of 12 times, total VOCs have always been detected (see Figure 1-5 of the RI). Section 3.4.2 confirms this. The kepone and mirex minima, means, and maxima make no sense when compared to the frequency detects (2/9 and 5/9). (FWS)*

Note that surface water quality criteria (WQC) are more stringent than many drinking water criteria, and that many detected concentrations were higher than these WQC. Also, no State criterion for aquatic life protection is provided by xylenes (total), although the State currently uses 211 ug/L (chronic) and 1055 ug/L (acute) (25 Pa. Code, Chapter 16). This omission must be corrected. (FWS)

Response: The frequency of detection information as shown on Table 4-4 was based on the surface water data as a whole and was not intended to be misleading. The frequency of detections has been revised in Table 4-4 to reflect the specific water body for which the data was collected (i.e., Spring Creek, FWDD, and Thornton Spring).

One-half of the reliable reporting limit (RL) was used in calculating the means. The RL is sometimes greater than the maximum detected concentrations (i.e., a particular VOC was only detected at a concentration between the detection limit and the reliable reporting limit).

The most stringent surface water ARAR (non-zero MCLGs, MCLs, or PA surface water quality standards) are used to establish remediation goals for surface water. The values for these ARARs have been corrected in Table 4-4.

Volume 4.0, Comment 31, Table 4-4:

Comment: *The following Chemical Specific ARARs for Surface Water Quality need to be corrected: (EPA)*

Federal Water Quality Criteria (ug/l)

Contaminant	*Human Health W&F**	*Human Health Fish***	*Aquatic Life Acute*	*Aquatic Life Chronic*
Toluene	6,800	200,000	+	-
Chlorobenzene	14.3	42.4	+	+
1,1,2,2-Tetrachloroethane	0.17	10.7	-	+
Benzene	1.2	71	-	-
Chlorobenzene	680	21,000	+	+
1,2-trans-dichloroethene	700	+	+	-
Ethylbenzene	3,100	29,000	+	-
Tetrachloroethene	-	-	+	+
1,1,2-Trichloroethane	-	-	-	+
Trichloroethene	-	-	+	+
Vinyl Chloride	-	530	-	-

PA Surface Water Quality

Contaminant	*W&F**	*Fish***	*Acute*	*Chronic*
Xylene	-	-	1055	211

** Water and Fish Ingestion*
*** Fish Ingestion Only*

Response: The values for various surface water ARARs have been checked against published values and corrected in Table 4-4. Federal Ambient Water Quality Criteria (AWQCs) have been deleted from Table 4-4 because they have been superseded by Federal Water

Quality Standards published in 40 CFR Part 131.36 which are in turn superseded by PA Water Quality Standards (25 PA Code, Chapters 16 and 93) which satisfy the requirements of Section 303(c)(2)(B) of the Federal Clean Water Act. Text in sections 4.3.3 (page 4-17), 4.6.6 (page 4-30), and 4.6.8 (page 4-32) have also been revised as needed.

Section 5.0, Comment 1, Page 5-7:

Comment: *Within the "Disposal" section, the text indicates that the acceptance of untreated groundwater discharge at the POTW is unlikely. Although the POTW would not likely accept untreated discharge, the scenario presumably presented for this FS is the disposal of the "treated" groundwater discharge. An evaluation of the viability of discharge of the treated groundwater to the POTW should be considered as an alternative to proposed continued discharge to the drainage ditch. (EPA)*

Response: Discharge of treated water to the POTW has been evaluated, however, it does not appear to be a viable alternative to discharge of treated groundwater to the FWDD. At the present time, the POTW does not have sufficient capacity to accept additional discharge, however, there is a plan to increase the capacity in the future. The additional capacity which could be made available to RNC is understood to be only 20,000 gallons per month (4.6 gpm) which is insufficient to dispose of the projected discharge volume.

Section 5.0, Comment 2, Page 5-8:

Comment: *The removal option for contaminated subsurface soils must be retained for documented "hot-spots" within the active plant area, particularly the Tank Farm/Building #1 area. To leave these "hot-spot" soils in place just prolongs the whole remediation process for the aquifer, Thornton Spring, and the Spring Creek ecosystem. (PADER, #6)*

Response: As stated in the FS, the excavation of all of the soils containing COC in the plant area is not feasible or implementable. In addition, as discussed in the response for Section 4.0, Comment 16, the primary source of groundwater COC is considered to be free product contained in karst bedrock fractures and cavities, both above and below the groundwater table, not COC in soil. Capping of plant areas will mitigate leaching of COC into the groundwater, and in conjunction with other remedial alternatives such as source control extraction wells, will effectively remediate downgradient areas of the aquifer as quickly as is feasibly possible.

Section 5.0, Comment 3, Page 5-9:

Comment: *Preventing migration of COC from soil, to be protective of groundwater, is among EPA's initial RAOs for soil. Levels of contamination in soils were evaluated in the Summers Model by Golder Associates and some VOCs were identified as exceeding allowable concentrations. Soil contamination was addressed (in response to groundwater considerations) despite some risk arguments disqualifying soil exposure hazards. Vapor extraction, capping, and excavation of soil are considered in the remediation evaluation. Supplemental methods, such as air sparging, to enhance reduction of VOC levels in soil below the water table, could be evaluated. Though air sparging, as SVE, may encounter problems due to soil permeability, it is reasonable to consider it. (EPA)*

Response: Air sparging was considered in the initial screening of technologies (refer to Table 5-2) but was not retained because the depth to groundwater is greater than the depth of overburden at the Site and air sparging is not feasible in fractured, karstic bedrock.

Section 5.0, Comment 4, Page 5-10:

Comment: *Institutional controls such as deed restrictions and fencing must be retained for Thornton Spring. Just because Ruetgers-Nease does not own the properties around the Spring doesn't mean they can't be implemented. (PADER, #7)*

Response: RNC will retain institutional controls. However, implementation of deed restrictions for Thornton Spring would require Agency action since RNC does not control the property. Changes to the FS were made to Sections 5.7 (pages 5-10 and 5-11), 6.3.2 (pages 6-6 and 6-7), 6.3.3 (pages 6-8 and 6-10), 7.2.2 (pages 7-7 through 7-9), 7.2.3 (pages 7-10 through 7-13), and Tables 5-8, 5-12, 6-13, 6-14, 7-1, and 7-2 with regard to this matter.

Section 5.0, Comment 5, Page 5-11:

Comment: *Source control at Thornton Spring must be retained due to uncertain effectiveness of the upgradient pump and treat system in the karst* *environment. The hydrogeologic system associated with the Ruetgers-Nease facility has been studied intensively for over 20 years and is still not adequately understood. In addition, the COC concentration and flow dynamics of Thornton Spring have never been correlated to the on-going pump and treat system. (PADER, #8)*

Response: Remedial alternatives to address the RAO for Thornton Spring have been evaluated in detail and include options for treatment at Thornton Spring (Alternative GW/TS-4).

Section 5.0, Comment 6, Page 5-11 - Sec 5.7:

Comment: Interception of Thornton Spring bound groundwater will not effectively treat spring water. High spring flows, which had higher VOC concentrations, would not be treated to counter the higher potential environmental damage. Discharge of pumped groundwater away from the spring alters groundwater contributions to Spring Creek near Pike Street and may cause thermal problems during drought. (PFBC)

Response: Refer to Response to Section 6.0, Comment 4 for discussion of VOC concentration in Thornton Spring as a function of flow.

Temperature and flow data for Spring Creek and Thornton Spring are reviewed below and thermal effects on Spring Creek, as a result of reducing Thornton Spring discharge and increasing the discharge of the FWDD, are estimated.

The temperature of Spring Creek, following implementation of a potential remedy which would decrease the flow in Thornton Spring and increase the flow in the FWDD by a commensurate amount, was estimated using a general, steady-state, temperature mass balance equation (Thomann, 1987).

Mean monthly temperature data for Spring Creek upstream of Lemont for the period of November 1990 through September 1991 were reported by Carline, et. al., and are summarized in Figure 1 of this document. Temperatures of the Thornton Spring discharge were estimated from groundwater temperature measurements presented in the Final RI Report which are consistent with a recent field observation at Thornton Spring. The temperature of Thornton Spring was assumed as constant since groundwater temperatures typically do not vary more than 2° to 3°F throughout the year

(Anderson, 1993). Temperatures of the FWDD discharge to Spring Creek were assumed to range from 40°F in winter to 70°F in summer.

Flow estimates for Spring Creek immediately upstream of Thornton Spring were obtained from the RI Report. The February 5, 1991 measurement was utilized as a representative Low Winter Season Flow and was applied as a conservative Spring Creek flow from November to April. The Spring Creek Q7-10 flow as estimated in the RI Report was applied as a conservative summer drought flow from May to September. The reduction in Thornton Spring flow and increase in discharge from the FWDD was assumed as the projected treatment plant discharge of 240 gpm.

Figure 1 presents the resulting estimated Spring Creek temperature downstream of the FWDD, together with the observed mean Spring Creek temperatures upstream of Thornton Spring, and the PaDER criteria for High Quality - Cold Water Fishes (25 PA Chapter 93).

As indicated on Figure 1, during the period of November through June, the observed mean Spring Creek temperatures upstream of Thornton Spring under current conditions equal or exceed the PaDER criteria. During the period of November through February, implementation of a remedy which involves decreasing the flow in Thornton Spring and increasing the flow in the FWDD reduces Spring Creek temperatures and contributes positively towards compliance with PaDER criteria. During the period of March through May, no effect is predicted on Spring Creek temperatures and between June and September, the temperatures increase on the order of 2°F but are still below PaDER criteria.

In summary, during the winter months, the effects of the potential remedy are expected to be positive in reducing Spring Creek temperatures and during the summer months Spring Creek temperatures are expected to increase slightly but will not exceed PaDER criteria.

References:

Thomann, R.V., 1987, Principals of Surface Water Quality Modeling and Control, Harper & Row.

Carline, R.F., C.J. Duffy, and U. Lalwani, 1992, Evaluation and Prediction of Thermal Effects of the University Area Joint Authority Wastewater Discharge in Spring Creek.

Anderson, K.E., 1993, Groundwater Handbook, National Groundwater Association.

Section 5.0, Comment 7, Page 5-11:

Comment: *The statement in reference to in-situ treatment "adverse short-term and long-term impacts to Thornton Spring environmental would be significant" needs to be deleted or quantified in light of the fact the Spring has been contaminated with organic chemicals for over 30 years. (PADER, #9)*

Response: The text on this page has been revised to state "Adverse short-term and long-term impacts to the Thornton Spring environment would be more significant than any impacts associated with existing conditions."

Section 5.0, Comment 8, Page 5-11 and 5-12 - Section 5.7:

Comment: *I am unaware of any hydrologic studies that have shown appreciable inputs to Thornton Spring from anywhere than the vicinity of the Site. While pumping groundwater may remediate Thornton Spring water, pumping will also remove water from the spring. This could adversely affects its ecological function, including its contribution to maintenance of Spring Creek's cold water thermal regime. This section also presents two options for collecting Thornton Spring water: 1) extraction of upgradient groundwater, and 2) collection at the Site. A combination of these options was not considered. Why not? (FWS)*

Response: Thermal issues pertaining to remediation of Thornton Spring water have been discussed in the Response to Section 5.0, Comment 6. Alternative GW/TS-4 includes both extraction of upgradient groundwater and treatment at Thornton Spring.

Section 5.0, Comment 9, Page 5-12:

Comment: *Collection and ex-situ treatment need to be retained due to the uncertain effectiveness of the upgradient pump and treat system. The elimination of these technologies based solely on private ownership of the Spring and variable flows is insufficient documentation. (PADER, #10)*

Response: Ex-situ treatment was not retained for detailed evaluation on the basis of engineering impracticability and the ability of other, more practical alternatives to meet the RAO.

Section 5.0, Comment 10, Page 5-16 - Removal:

Comment: *The dredging technologies evaluated did not include vacuum dredging similar to that demonstrated at the Paoli Rail Yard Site. Given the promising results of that demonstration, that type of technology should be considered here as well. As I stated before, I believe that Thornton Spring and FWDD section B should also have RAOs, and alternatives evaluated. (FWS)*

Response: As discussed in Section 5.9 of the FS, hydraulic or vacuum dredging is not applicable to the FWDD. Mechanical dredging is a feasible alternative and is more appropriate than hydraulic or vacuum dredging because the FWDD is dry except when there is a discharge from the Treatment Plant. Hydraulic and vacuum dredging are discussed for Spring Creek sediments.

Section 5.0, Comment 11, Page 5-17:

Comment: *The Department disagrees with the assertion that "there are no unacceptable potential human health risks associated with Spring Creek sediments or ingestion of fish". (PADER, #11)*

Response: Comment noted, however, as stated in the response to Section 4.0, Comment 27, the risks are within or less than USEPA's acceptable risk range of $1x10^{-4}$ to $1x10^{-6}$ for potential excess lifetime cancer risks and less than or equal to a cumulative Hazard Index value of 1 for non-carcinogenic health effects.

Section 5.0, Comment 12, Page 5-18:

Comment: *The statement "mirex and kepone levels in fish tissue have substantially attenuated over the past 15 years" is not statistically substantiated. Additionally, there is no factual basis to indicate "natural burial of impacted sediments continues to occur". Leaving the sediment in place is not a long-term, permanent solution to the problem because it acts as a prime avenue for kepone and mirex to enter the food chain where they are bio-magnified* *to levels exceeding FDA action levels. Therefore, how does Spring Creek meet all of the criteria for a No-Action option? (PADER, #12)*

Response: In accordance with the USEPA guidance document Selecting Remediation Techniques for Contaminated Sediment, June 1993, the no-action option is appropriate when the pollutant discharge source has been halted, burial, or dilution processes are rapid, sediment will not be remobilized by human or natural activities, and environmental effects of cleanup are more damaging than allowing the sediment to remain in place. The decline in mirex and kepone levels in fish tissue has been further documented in the Environmental Risk Assessment (ENVIRON, March, 1994) and is attested to by PFBC and USFWS (PaDER Environmental Quality Board Redesignation Appeal Hearing, High Quality - Cold Water Fishery, Spring Creek Township, April 2, 1991). Existing source control measures have been in place since 1982 and it is therefore logical that some sediment burial has occurred and will continue as additional controls are implemented. As noted in the FS, the No-Action alternative was selected for the James River Site where kepone levels exceed those in Spring Creek by more than three orders of magnitude.

Section 5.0, Comment 13, Page 5-19:

Comment: *The institutional controls in place on Spring Creek were issued in January 1982 by the Pa. Fish and Boat Commission as a direct result of kepone and mirex levels exceeding FDA action levels in fish. Spring Creek is listed in the Department of Environmental Resources 1990 and 1992 "Water Quality Assessment Report" (305(b) Report) as one of only two streams in the Commonwealth in which it is unlawful to kill or possess any fish. The 1990 Water Quality Standard Review referenced in this portion of the FS was a study conducted of the Spring Creek watershed to determine whether it warranted Special Protection status. Although the study found that "Spring Creek supports an excellent brown trout population," it was recommended that the creek remain designated as Cold Water Fishes because of "the presence of mirex-contaminated fish tissue, and a no harvest policy on 18 miles of Spring Creek". The proper way to manage fishery resources in Pennsylvania is by utilizing scientific best management practices, not by issuing health advisories or no kill regulations. (PADER, #13)*

Response: Spring Creek was in fact granted special protection status after PaDER's Environmental Quality Board held a hearing in 1991 at which PFBC and USFW attested to the fact that kepone and mirex levels were declining and were then close to the FDA action levels. It is perhaps ironic, but nevertheless true, that the Spring Creek fishery has flourished as a direct result of the catch and release order (Carline, R.F., and T. Beard, Jr., 1991, Response of Wild Brown Trout to Elimination of Stocking and to No-Harvest Regulation, N. Amer. J. of Fisheries Management, 11:253-266.) and the order could, by its results, be construed as "best management practice." In accordance with CERCLA, the FS is required to consider all feasible options which meet the remedial action objectives, including no action and institutional controls, and to evaluate them against the NCP criteria.

Section 5.0, Comment 14, Page 5-20 - Removal:

Comment: *As with FWDD sediments, vacuum dredging technologies should be evaluated here because of their effectiveness, low cost, and minimal environmental damage. Because of the tendency of kepone and mirex to adhere to fine sediment particles, there may be areas where vacuum dredging could be done with little environmental damage. Because this technology has not been considered, this report has reached the conclusion that more environmental damage will result from cleanup than leaving the sediments in place with incomplete data. With selective removal, re-establishment of the ecosystem would not taken "many years". (FWS)*

Response: A discussion regarding vacuum dredging has been added to the FS. Changes were made to Sections 5.10 (pages 5-20 and 5-21), 6.7 (pages 6-22 through 6-29), 7.6 (pages 7-48 through 7-71), and Tables 5-12, 6-11, 7-1, and 7-2. New Tables 6-24, 6-25, 6-26, and 7-3 were added to the FS.

Section 5.0, Comment 15, Page 5-21:

Comment: *Hydraulic dredging, in all likelihood, would not have to be conducted throughout the entire length of Spring Creek in the Study Area because the known areas of sediment contamination are the depositional zones. In addition, kepone and mirex are strongly adsorbed to organic materials which are usually most prevalent in depositional zones. Therefore, the impacts of dredging to the aquatic community may be short-term and moderate, and not long-term and adverse. (PADER, #14)*

Response: An assessment of the morphology of Spring Creek has been made and added as Appendix H of the FS in which depositional zones have been estimated. The duration and severity of long-term impacts of dredging cannot be reliably predicted. However, based on the evaluation of the dredging alternative in Section 7.6.3, short-term impacts would likely be severe with possible long-term adverse effects on the Spring Creek ecology.

Section 6.0, Comment 1, Page 6-1 - General Comment:

Comment: *Vacuum dredging should be evaluated for Thornton Spring sediment, freshwater drainage ditch sediment, and Spring Creek sediment. This method has minimized ecological impacts of remedial action in other applications and would help meet the Spring Creek sediment RAO. (PFBC)*

Response: Vacuum dredging for Thornton Spring is not feasible because of the low volume of sediment in Thornton Spring, the large proportion of cobbles and boulders, and the anticipated large volume of water which would be removed. According to experienced contractors, vacuum dredging does not work well in areas made up predominantly of cobbles and boulders. Vacuum dredging for FWDD sediments has been discussed in the response to Section 5.0, Comment 10.

Vacuum dredging of Spring Creek sediments has been discussed in the response to Section 5.0, Comment 14.

Section 6.0, Comment 2, Page 6-6 - Section 6.3.2:

Comment: *The addition of semi-annual sampling of Thornton Spring surface water should be considered as part of the sampling scheme associated with this remedial alternative. (EPA)*

Response: Section 6.3.2 includes sampling and analysis of Thornton Spring surface water. Semi-annual sampling of Thornton Spring surface water has been added to Section 6.3.1. Note that Table 6-12 had already included costs for semi-annual sampling and analysis of Thornton Spring surface water.

Section 6.0, Comment 3, Page 6-7 - General Comment:

Comment: *The description of the GW/TS-3 alternative indicates that Site groundwater will essentially be prevented from migrating to Thornton Spring, and the* *only discharge at Thornton Spring will originate from downgradient of the Site. Several additional issues should be considered with this alternative:*

a. *<u>Adequacy of the FWDD for Projected Flow:</u> An analysis of the suitability of the FWDD to handle the estimated 240 gpm to be discharged from the treatment plant should be considered, with regard to adequacy to handle this discharge flow and other flow (stormwater runoff) along the length, suitability of discharge point at Spring Creek (erosion control), etc. An analysis of how much of this discharge would percolate into the ground in the vicinity of the extraction system should also be considered to determine what impact, if any, if a large percolation rate would have on the extraction and migration control system; (EPA)*

b. *<u>Potential Environmental Impact, if any, on a Thornton Spring Flow Rate Reduction:</u> An analysis of the potential environmental impact of reduced flow should be considered for Thornton Spring, with regards to changing water quality of Spring Creek (for flow originating from Thornton Spring as compared to flow originating from the FWDD), potential habitat changes, etc.; (EPA)*

c. *<u>Feasibility of a Complete Containment System:</u> Given the uncertainty of groundwater flow in a karst area, it is unlikely that any groundwater collection system in this area would be completely successful in preventing Site-related contaminants from reaching Thornton Spring. Therefore, an alternative which includes elements which are beyond alternative GW/TS-2 (existing system) but less than that presented for GW/TS-3 should be considered. For example, enhancement of the current groundwater extraction system (through well rehabilitation and additional well installation) with a goal of increased groundwater collection above 20 gpm but presumably less than 240 gpm may be a logical alternative to evaluate. This type of alternative may be more reasonable for the Site given the site physical setting. (EPA)*

Response: a. Refer to response to Section 6.0, Comment 8, for a discussion of FWDD capacity.

The FWDD on site has an existing clay lining which limits infiltration. It is anticipated that the selected remedy for the FWDD on site will include a similar provision. Infiltration further downstream would be downgradient of the migration management wells and would not be detrimental to performance of the groundwater extraction system.

b. Potential thermal impacts on Spring Creek are addressed in the Response to Section 5.0, Comment 6. Impacts to Spring Creek water quality are expected to be beneficial and, since Thornton Spring provides limited habitat at present, any habitat changes are not likely to be significant nor are they likely to impact Spring Creek.

c. In essence, RNC does not disagree with this comment. Although alternative GW/TS-3 describes a particular number of wells used for cost estimate purposes, it is possible that in a final system design the actual number of wells may be somewhere between the numbers presented in GW/TS-2 and GW/TS-3. The actual number of wells and associated flow rates is considered to be a design issue and would be fully evaluated in the Pre-Design and Design stages of the project when additional data will be available from pumping tests, etc.

Section 6.0, Comment 4, Page 6-7:

Comment: *This alternative will utilize additional wells to reverse groundwater migration and treat it at an expanded wastewater treatment plant. The capacity of the system is 240 gpm. Thornton Spring, however, can flow as much as 3,280 gpm, and highest concentrations were associated with highest flows. There is nothing to indicate that under peak flows, the increase is due only to water downgradient of the Site. On the contrary, the increase in concentration of VOCs with the increase in flow implies that most of the water discharged from the spring originates on the Site. Thus, COC control will only be achieved at certain flows or below. ARARs may not be met during much of the time. Also, the present system is designed to operate for 30 years, although the estimated time required to meet cleanup goals is 57 years, or longer if DNAPL (dense non-aqueous phase liquid) is present. (FWS)*

Response: At the time of submittal of the Draft FS, limited flow and VOC data for Thornton Spring were available. Thornton Spring VOC concentrations and flow data have been reviewed for the period of April 1993 through April 1994 and are presented in Figure 2 attached. Based on this expanded data set, the suggested correlation between increased total VOCs and increased flow of Thornton Spring is no longer substantiated.

In accordance with normal practice, FS cost estimates were based on a 30-year operation period to provide a consistent basis for comparison of alternatives. This does not imply that a system would be designed to operate for only 30 years.

Section 6.0, Comment 5, Page 6-10:

Comment: *It is suggested that option GW/TS-3: Groundwater Source and Migration Control would meet the RAOs for soil without alternate remediation of the soil. Though this was stated, soil remediation methods were evaluated. In evaluation of the time frame for cleanup within the plume source area (Appendix E), it does not appear that soil conditions were considered (e.g., soil as source of contamination, comparison of capping and the no-action option). (EPA)*

Response: At the request of the EPA, alternatives for different media were not combined in the FS. Ultimately, it is envisioned that the EPA will combine alternatives into a selected site-wide remedy.

Section 6.0, Comment 6, Page 6-13:

Comment: *With regard to alternative SS-2, a total of 40 soil samples are described for collection and analysis. The appropriateness of this number should be reevaluated. Many additional samples may be required. For example, prior to excavation, additional soil sampling would be appropriate to ensure that the areas in question are identified and sufficiently delineated. Further, during excavation activities, additional soil samples would likely be required to ensure that applicable soil criteria have been met. Therefore, the number of samples that would likely be required, as presented, appears to be low. (EPA)*

Response: The estimated number of 40 soil samples for remedial action cost estimating purposes includes only confirmation samples taken as part of remedial action. It is acknowledged that additional characterization samples would be required as part of a Pre-Design Investigation if this alternative is selected by EPA; the cost of Pre-Design Investigations is not conventionally included in FS remedial action cost estimates.

Section 6.0, Comment 7, Page 6-13 and 6-14:

Comment: *The text indicates that in some areas COCs are present below the water table at concentrations that may adversely affect groundwater quality, and that SVE may not be capable of meeting the RAOs. A combination of SVE with air sparging should be considered for remedial analysis for these types of areas. Air sparging can be extremely effective in addressing contaminants in soil below the water table, and may be viable for the Site. (EPA)*

Response: As stated above in Response to Comment 3, Section 5.0, air sparging was considered but not retained because the water table is below the top of bedrock.

Section 6.0, Comment 8, Page 6-19:

Comment: *Evaluation of the FWDD/SED-2 alternative should include the adequacy of a soil lined FWDD to handle expected treatment discharge flows (flow rate, erosion control, ditch size, etc.) proposed under the various groundwater treatment alternatives. Alternative FWDD/SED-3 should also be evaluated for this issue. (EPA)*

Response: The flow limiting feature of the FWDD will be the culverts which exist at various locations. Based on a Site inspection, the limiting culvert has a diameter of 2 feet and a flow capacity several times the maximum discharge rate of 240 gpm anticipated from the groundwater treatment plant. Use of the FWDD as the discharge, therefore, is feasible from an engineering perspective. It is anticipated that selection of a suitable lining (specifically the grain size of lining material to avoid erosion) and any other upgrades required to the FWDD will be addressed during the design phase of the remediation.

Section 6.0, Comment 9, Page 6-22:

Comment: *The inclusion of a sediment monitoring program element should be considered as part of alternative SC-2 (Institutional Controls). An on-going sediment monitoring program would provide data that can be correlated to the biota monitoring program for effective management of the institutional controls. (EPA)*

Response: A sediment monitoring program has been added as a program element of remedial alternative SC-2 in Section 6.7.2 of the FS. The monitoring program will include stream channel sediments and fish tissue.

Section 6.0, Comment 10, Page 6-23:

Comment: *As stated earlier, not all applicable dredging technologies were evaluated. Section 6.7.3 then, overstates environmental damage from dredging and leads to a faulty conclusion that a No Action alternative is appropriate. (FWS)*

Response: Discussion of vacuum dredging has been added to the FS. Environmental impacts of dredging have been discussed in Section 7.6.6 of the FS.

Section 6.0, Comment 11, Table 6-14 (and others, as appropriate):

Comment: *It is not apparent if analytical costs associated with the sludge disposal are included in the lump sum cost provided. If not included, a recalculation of the cost of sludge disposal to include the necessary analytical costs should be considered. (EPA)*

Response: It is expected that only a small volume of solids will be produced as a result of treatment processes including sediment build-up in the equalization tank, bag filter deposits, etc., and therefore the lump sum allowance is considered adequate to cover analytical costs associated with proper characterization prior to disposal.

Section 6.0, Comment 12, Table 6-14:

Comment: *In the cost estimate for Remedial Alternative GW/TS-3, it is stated that the system does not include free product recovery. It is unclear whether option GW/TS-3 does not include free product recovery or if the equipment selected and cost estimated does not include what would be needed for free product recovery. It is also uncertain if the system for option GW/TS-4 includes free product recovery. (EPA)*

Response: As stated in Response to Comment 15, Section 4.0, free product recovery will be accomplished passively by phase separation in the treatment plant. Phase separation can be achieved through minor modifications to the equalization stage of the treatment process train.

Cost revisions have been made to Remedial Alternatives GW/TS-3 and GW/TS-4 as reflected on revised Tables 6-14 and 6-15.

Section 6.0, Comment 13, Table 6-17:

Comment: *The overall cost of the SVE system proposed at the Site appears to be low, given the scale and description of the system. For example, engineering services for this type of remedial action would include system design, oversight of construction, and system testing. The cost estimate for this service appears low. The O&M cost of $40,000 per year also appears to be low. Based on project experience, catalytic oxidation units can be expensive to operate with regard to power requirements, catalyst changes, and monitoring requirements. In addition, overall monitoring of the system for optimum system performance, given the size of the system, would likely require more labor than anticipated. A reevaluation of the costs associated with this alternative should be considered. (EPA)*

Response: The costs associated with this alternative were re-evaluated and revised costs are presented on Table 6-17. Revisions were also made to text (page 7-29), Tables 7-1 and 7-2, and Appendix F. Additionally, Figure 6-4 has been revised such that the figure is clearer to read. The extent of SVE has not been changed.

Section 6.0, Comment 14, General Comment:

Comment: *There are no costs provided for the remedial alternatives presented for Spring Creek sediments. For completeness, development of cost estimates for these alternatives should be considered. (EPA)*

Response: Cost estimates have been developed for Spring Creek sediment remedial alternatives and are presented in the FS as Tables 6-24 through 6-26. Section 6.7 has been expanded to include a more detailed analysis of Spring Creek remedial alternatives and Tables 7-1 and 7-2 have been revised. Section 7.6 has been added to the FS to evaluate and compare remedial alternatives for Spring Creek sediment.

Section 7.0, Comment 1, General Comment:

Comment: *The FS contains a detailed analysis of ARARs, but only a vague qualitative discussion about risk reduction and no risk-based cleanup goals. A more* *complete consideration of risk reduction should be added, for several reasons. First, some ARARs (e.g., the MCL for vinyl chloride, a major COC at this Site) are based on feasibility of removal or detection, and are set at high levels of cancer risk. Second, ARARs are single-contaminant, single-medium regulations which do not consider effects of multiple chemicals and exposure routes. Third, an estimate of residual risks would ensure that the selected alternative satisfies the risk-reduction requirements of the NCP. Fourth, having an estimate of remaining risks associated with various cleanup strategies provides an opportunity to analyze the cost and benefit (i.e., risk reduction) of each.*

Section 7.0 of the FS should be expanded to include, for each developed alternative, concentrations of mirex and carcinogenic VOCs which would remain in soil, groundwater, or surface water after completion of remediation. For treatment technologies such as groundwater pumping and treating, these concentrations would be the residual remaining after pumping ceased. For containment technologies such as capping, they would be the average remaining outside the containment. For soil removal alternatives, they would be the average left in place.

These predicted post-remedial concentrations can be based on prior experiences at other sites, bench- or pilot-scale tests, or (as a last resort) best professional judgment. For containment and removal alternatives, it would be useful to estimate costs and residual concentrations for several different sizes of containment or excavation.

The estimated post-remedial exposure concentrations should then be used to estimate post-remedial risk, using the same algorithms and assumptions used in the baseline risk assessment. Cost and post-remedial risks should be presented on the same graph. (EPA)

Response: Post-remedial residual cancer risks have been estimated for each alternative evaluated for groundwater/Thornton Spring (Figure 7-1) and on-site soil for hypothetical future residential use scenario (Figure 7-2). As per Section 4.2.2 of the FS, unacceptable baseline human health risks were not associated with on-site surface water or sediment (FWDD) and Spring Creek surface water or sediment. Text has been added to the FS to compare post-remedial residual risk and remedial cost for each alternative evaluated for groundwater/Thornton Spring (Section 7.2.6) and on-site soil (Section 7.3.6).

Section 7.0, Comment 2, Page 7-13:

Comment: *The PFBC asserts that in-situ treatment of Thornton Spring surface water must occur to eliminate toxic effects demonstrated in Pimephales promelas and Ceriodaphnia dubia. Treatment would cause the groundwater/Thornton Spring drinking water MCL ARAR to be met for total 1,2-dichloroethene, tetrachloroethene, and trichloroethene, as addressed in the PFBC comments on Section 4.6.2. Is a more compact carbon tower, rather than a bed configuration, possible for a VOC treatment facility? (PFBC)*

Response: Remedial alternatives GW/TS-3 and GW/TS-4 would both meet the MCL ARAR for Thornton Spring and would consequently eliminate the cited toxic effects. Should in-situ treatment at Thornton Spring be selected as the preferred remedy, several design configurations of the carbon could be considered although a tower design is not considered practical at this time for the flows involved.

Appendix E, Comment 1, General Comment:

Comment: *The overall approach presented for evaluating aquifer cleanup periods may not be the most appropriate for the site. The generalized particle retardation model probably does not accurately predict the retardation of COCs in groundwater moving through a karst system, and consequently, the travel and cleanup time calculated by this method could be misleading. Unfortunately, a more appropriate and easy method for evaluating aquifer cleanup time for the Site, given the hydrogeology of the Site, is not available. Therefore, the specific cleanup times presented in the report should be qualified as being uncertain. An alternative to the presentation of specific time periods (e.g., 60 years) could be the presentation of ranges (for example - < 15 years, 15-50 years, etc.). The use of ranges could be a more reasonable way of presenting the uncertainty in the cleanup times. (EPA)*

Response: Based upon the hydrogeology of the Site, it is agreed that cleanup times as presented in Appendix E are uncertain. Therefore, revisions to pages E-7 and E-9 have been made as suggested by using ranges rather than specific time periods. Revisions were also made to text pages 6-8 and 7-12.

It should be noted that while it may take greater than 50 years to cleanup for specific COCs, it may take a much shorter time to clean up for other COCs.

Appendix F, Comment 1, Page F-4:

Comment: *It is unclear as to how the general costs presented in this Appendix correlate with the costs presented for alternative SS-3 (SVE application) in Table 6-17 and other locations. Specifically, it is unclear which phase and location designation presented on page F-4 are the ones used in the main portion of the FS. This discrepancy between the Appendix and main text should be addressed. (EPA)*

Response: Appendix F has been revised to remove discrepancies between pages F-3 and F-4 and the main text of the FS.

Z:COMMENTS:OCTFS.RSP

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TRANSMITTAL LETTER

To: Mr. Frank Klanchar
USEPA Region (3HW24)
841 Chestnut Building
Philadelphia, PA 19107-4431

Date: June 30, 1994

Project No.: 923-6112

Sent by:

[ ] Mail
[ ] Courier
[ ] Hand Carried
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[X] Federal Express
[ ] Enclosed

Quantity	Item	Description
3	Copies	Figures 1 and 2 for the Response to Comment Document pertaining to the Feasibility Study for the Centre County Kepone Site, State College, PA

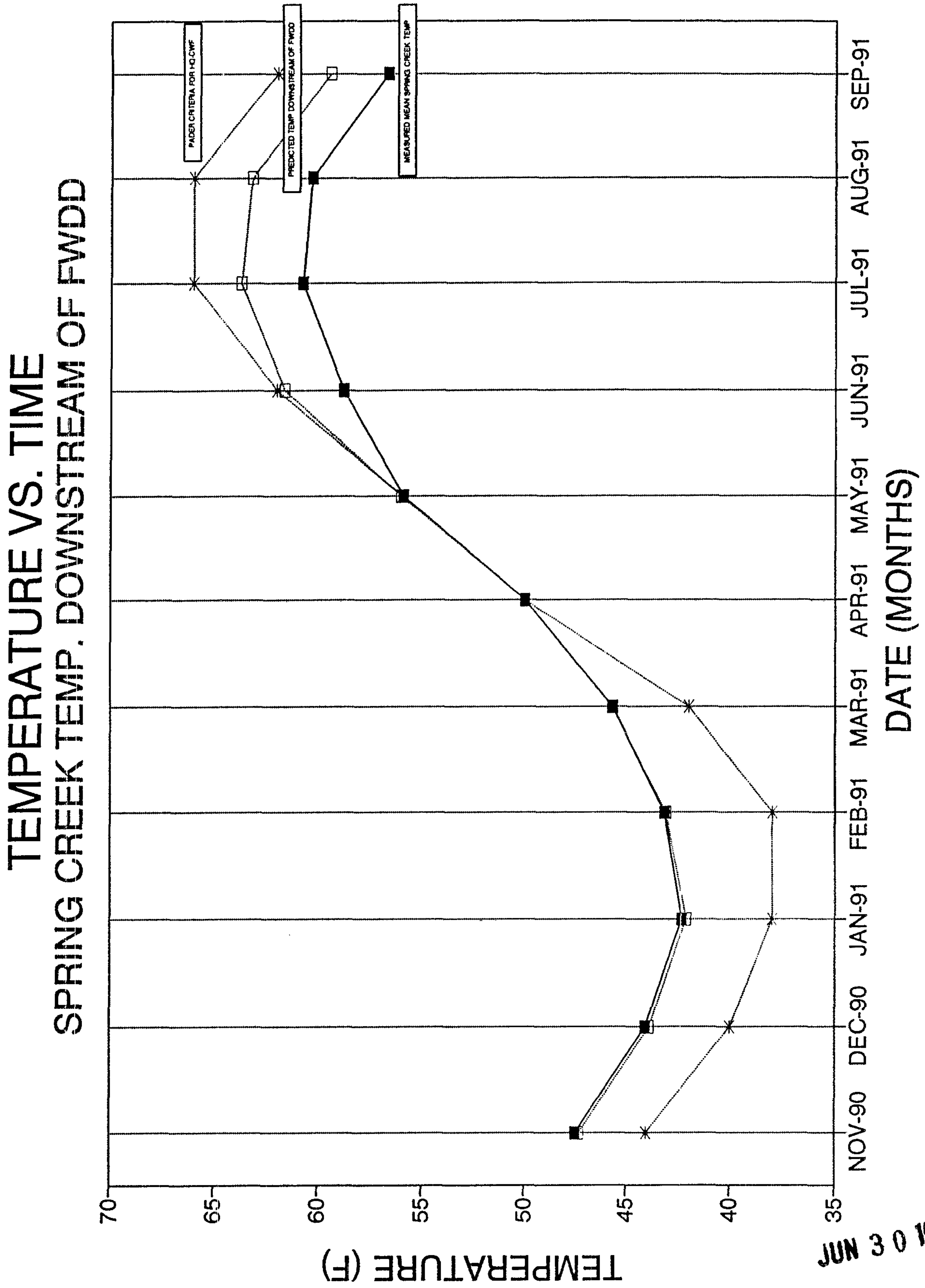
Remarks:
Please find enclosed three copies of Figures 1 and 2 for the Response to Comment document which were inadvertently left out of the copies submitted to you on June 30, 1994.

We hope that this has not caused you any inconvenience.

Per: Steve Finn/Randy White

cc: Ralph Pearce, RNC

AR308453



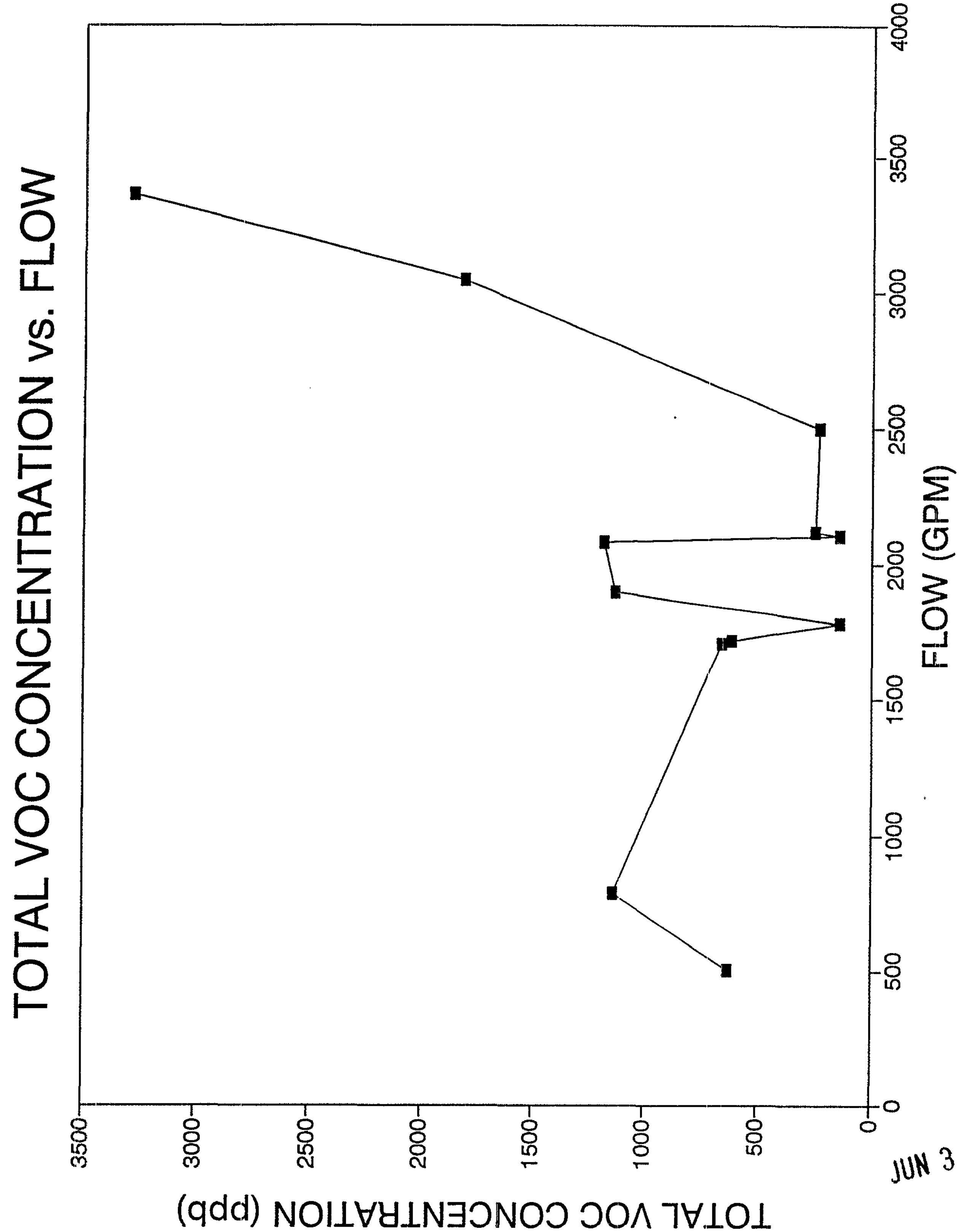
Measured Spring Creek temperature data from Carline et. al. (1992)

JUN 30 1994

JOB No.:	923-6112	SCALE:	N/A	**SPRING CREEK TEMPERATURE**
DR BY:	MRM	DATE:	06/27/94	
CHK BY:		FILE No.:	PA17-236	
REV BY:	RSW	DR SUBTITLE:	02	

Golder Associates | RUETGERS-NEASE CORPORATION | FIGURE **1**

AR308454



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JOB No.:	923-6112	SCALE:	N/A
DR BY:	MRM	DATE:	06/27/94
CHK BY:		FILE No.:	PA17-237
REV BY:	RSW	DR SUBTITLE:	02

THORNTON SPRING
TOTAL VOC vs. FLOW
4/93 - 4/94

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RUETGERS-NEASE CORPORATION

FIGURE **2**

AR308455